SN. No. 10/597,407

ATTORNEY DOCKET No. YAMA:132

IN THE CLAMS

1.   (Currently Amended) A speaker array apparatus, comprising:

a speaker array that has a plurality of speakers for outputting audio beams based on a test audio signal;

a test sound sweep portion that sweeps with the audio beams;

a microphone that is placed in a listening position and collects a test sound including direct sounds and reflected sounds of the audio beams output from the speaker array;

a storage portion that stores a signal level of the test sound collected by the microphone[[,]] and sweep angles of the audio beams when the audio beams corresponding to the test sounds are output from the speaker array therein so as to correlate with each other with which audio beams corresponding to the test sound are output;

a selection portion that selects a plurality of peaks of the signal level based on the signal level of the test sound stored in the storage portion; and

a beam setting portion that sets the sweep angles of the selected plurality of peaks as beam output angles which are angles to output audio beams of channels of a multi-channel surround-sound respectively.

2.   (Currently Amended)   [[The]] A speaker array apparatus according to claim 1, comprising:

a speaker array that has a plurality of speakers for outputting audio beams based on a test audio signal;

a test sound sweep portion that sweeps with the audio beams;

a microphone that is placed in a listening position and collects a test sound including direct sounds and reflected sounds of the audio beams output from the speaker array;

a storage portion that stores a signal level of the test sound collected by the microphone, and sweep angles with which audio beams corresponding to the test sound are output;

a selection portion that selects a plurality of peaks of the signal level based on the signal level of the test sound stored in the storage portion; and

a beam setting portion that sets the sweep angles of the selected plurality of peaks as beam output angles which are angles to output audio beams of channels of a multi-channel surround-sound respectively;

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wherein the beam setting portion sets a sweep angle of a peak where the signal level of the test sound is the highest, as a beam output angle of a center channel of the multi-channel surround-sound.

3.   (Currently Amended)   [[The]]   A speaker array apparatus ~~according to claim 1~~, comprising:

a speaker array that has a plurality of speakers for outputting audio beams based on a test audio signal;

a test sound sweep portion that sweeps with the audio beams;

a microphone that is placed in a listening position and collects a test sound including direct sounds and reflected sounds of the audio beams output from the speaker array;

a storage portion that stores a signal level of the test sound collected by the microphone, and sweep angles with which audio beams corresponding to the test sound are output;

a selection portion that selects a plurality of peaks of the signal level based on the signal level of the test sound stored in the storage portion; and

a beam setting portion that sets the sweep angles of the selected plurality of peaks as beam output angles which are angles to output audio beams of channels of a multi-channel surround-sound respectively;

wherein when the number of peaks selected from the signal level of the test sound stored in the storage portion is smaller than the number of channels of the multi-channel surround-sound, the beam setting portion sets the sweep angles of the selected peaks as beam output angles of one or more channels of the multi-channel surround-sound, and sets sounds of channels other than the channels for which the beam output angles are set, as direct sounds to be output to be propagated directly to the listening position.

4.   (Original)   The speaker array apparatus according to claim 2, further comprising an information portion that provides at least information to prompt the user to change the listening position or to prompt the user to change a sound reproduction method when the beam output angle of the center channel of the multi-channel surround-sound set by the beam setting portion is shifted from a direction perpendicular to a front surface of the speaker array by an angle greater or equal to a predetermined angle.

5. (Original) The speaker array apparatus according to claim 2, wherein when the output angles set for the channels respectively are asymmetric with respect to the beam output angle of the center channel, the beam setting portion forms a signal localization of one of the channels as a phantom using audio beams directed in a plurality of directions so as to form a symmetric sound field.

6. (Currently Amended) [[The]] A speaker array apparatus ~~according to claim 1, further~~ comprising:

a speaker array that has a plurality of speakers for outputting audio beams based on a test audio signal;

a test sound sweep portion that sweeps with the audio beams;

a microphone that is placed in a listening position and collects a test sound including direct sounds and reflected sounds of the audio beams output from the speaker array;

a storage portion that stores a signal level of the test sound collected by the microphone, and sweep angles with which audio beams corresponding to the test sound are output;

a selection portion that selects a plurality of peaks of the signal level based on the signal level of the test sound stored in the storage portion;

a beam setting portion that sets the sweep angles of the selected plurality of peaks as beam output angles which are angles to output audio beams of channels of a multi-channel surround-sound respectively; and

an input portion that accepts an input of installation position information of a body of the speaker array apparatus;

wherein the beam setting portion selects a plurality of peaks from the signal level of the test sound stored in the storage portion based on the installation position information of the body.

7. (Currently Amended) [[The]] A speaker array apparatus ~~according to claim 1,~~ comprising:

a speaker array that has a plurality of speakers for outputting audio beams based on a test audio signal;

a test sound sweep portion that sweeps with the audio beams;

a microphone that is placed in a listening position and collects a test sound including direct sounds and reflected sounds of the audio beams output from the speaker array;

a storage portion that stores a signal level of the test sound collected by the microphone, and sweep angles with which audio beams corresponding to the test sound are output;

a selection portion that selects a plurality of peaks of the signal level based on the signal level of the test sound stored in the storage portion; and

a beam setting portion that sets the sweep angles of the selected plurality of peaks as beam output angles which are angles to output audio beams of channels of a multi-channel surround-sound respectively;

wherein the test sound sweep portion modulates the signal level of the test sound with an envelope having a maximum at the center of a sweep range of the audio beams.

8.   (Currently Amended)   [[The]]   A speaker array apparatus ~~according to claim 1,~~ comprising:

a speaker array that has a plurality of speakers for outputting audio beams based on a test audio signal;

a test sound sweep portion that sweeps with the audio beams;

a microphone that is placed in a listening position and collects a test sound including direct sounds and reflected sounds of the audio beams output from the speaker array;

a storage portion that stores a signal level of the test sound collected by the microphone, and sweep angles with which audio beams corresponding to the test sound are output;

a selection portion that selects a plurality of peaks of the signal level based on the signal level of the test sound stored in the storage portion; and

a beam setting portion that sets the sweep angles of the selected plurality of peaks as beam output angles which are angles to output audio beams of channels of a multi-channel surround-sound respectively;

wherein the speaker array outputs audio beams based on a test audio signal having no correlation and limited to a band where beams can be formed.

9. – 16. (Canceled)

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